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SIEMENS

PATENT
Attorney Docket No. 2001P07053WOUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Inventor:	Thomas Völkel	)	
		)	Group Art Unit: 2857
Serial No.:	10/764,295	)	
		)	Examiner: Jeffrey R. West
Filed:	January 23, 2004	)	

Title: SPECTRAL EVALUATION OF AN OBJECT TO BE TESTED

Mail Stop Appeal Brief-Patents
United States Patent and Trademark Office
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Alexandria, VA 22313-1450

APPELLANT'S BRIEF UNDER 37 CFR 41.10

This brief is in furtherance of the Notice of Appeal filed in this application on November 21, 2006.

1. REAL PARTY IN INTEREST - 37 CFR 41.37(c) (1) (I)

The real party in interest in the present Appeal is the assignee of record of the present application, Siemens Aktiengesellschaft.

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FACSIMILE COVER SHEET

In the UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Thomas Völkel

Application No. 10/764,295 Attorney Docket No. 2001P07053WOUS

Filed: January 23, 2004

Title: SPECTRAL EVALUATION OF AN OBJECT TO BE TESTED

Examiner: Jeffrey R. West Art Unit: 2857

⇨ **FACSIMILE ATTN TO: JEFFREY R. WEST FAX NO.: 571-273-8300**

APPEAL BRIEF

Commissioner for Patents
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PTO/SB/17 Fee Transmittal Form (2 pgs. – 1 original + 1 copy); and
Appeal Brief (12 pg.)

Number of pages being transmitted (including this cover sheet): 16 pgs

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PTO/SB/21 (09-04)
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission: 16

Application Number	10/764,295
Filing Date	January 23, 2004
First Named Inventor	Thomas Völkel
Art Unit	2857
Examiner Name	Jeffrey R. West
Attorney Docket Number	2001P07053WOUS

ENCLOSURES *(check all that apply)*

- ☒ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) ____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:
  1) Facsimile Cover Sheet including a certificate of transmission under 37 CFR 1.8
  2) Appeal Brief

Remarks

Appeal Brief is being filed.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm	SIEMENS		
Signature			
Printed Name	JOHN P. MUSONE		
Date	JANUARY 8, 2007	Reg. No.	44,961

CERTIFICATE OF TRANSMISSION/MAILING

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Signature	Ann Hickey		
Typed or printed name	ANN HICKEY	Date	JANUARY 8, 2007

Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL for FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 500

Complete if Known	
Application Number	10/764,295
Filing Date	JANUARY 23, 2004
First Named Inventor	THOMAS VÖLKEL
Examiner Name	JEFFREY R. WEST
Art Unit	2857
Attorney Docket No.	2001P07053WOUS

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify) : _____

☒ Deposit Account Deposit Account Number: 19-2179 Deposit Account Name: SIEMENS CORPORATION

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee

☒ Charge any additional fee(s) or underpayments of fee(s) Under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee($)	SEARCH FEES Fee($)	SEARCH FEES Small Entity Fee($)	EXAMINATION FEES Fee($)	EXAMINATION FEES Small Entity Fee($)	Fees Paid ($)
Utility	300	150	500	250	200	100	____
Design	200	100	100	50	130	65	____
Plant	200	100	300	150	160	80	____
Reissue	300	150	500	250	600	300	____
Provisional	200	100	0	0	0	0	____

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 30 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims		Extra Claims	Fee($)		Fee Paid ($)
____	-20 or HP=	____	x ____	=	____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		Extra Claims	Fee($)		Fee Paid ($)
____	- 3 or HP=	____	x ____	=	____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims Fee ($)	Fee Paid ($)
____	____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		Extra Sheets		Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
____	- 100 =	____	/ 50 =	____ (round up to a whole number)	x	= ____

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	____
Other (e.g., late filing surcharge) : **Filing a brief in support of an appeal 1402/2402**	500

SUBMITTED BY

Signature		Registration No. (Attorney/Agent)	44,961	Telephone	407-736-6449
Name (Print/Type)	JOHN P. MUSONE			Date	JANUARY 8, 2007

2. RELATED APPEALS AND INTERFERENCES - 37 CFR 41.37(c) (1) (ii)

To the best of our knowledge, there is no other appeal, interference or judicial proceeding that is related to or that will directly affect, or that will be directly affected by, or that will have a bearing on the Board's decision in this Appeal.

3. STATUS OF CLAIMS - 37 CFR 41.37(c) (1) (iii)

Claims cancelled: 2, 3, 9, 11, 12, 14, 16, 17 and 19.
Claims withdrawn but not cancelled: none.
Claims pending: 1, 4-8, 10, 13, 15, and 18.
Claims allowed: none.
Claims rejected: 1, 4-8, 10, 13, 15, and 18.
Claim rejections appealed: 1, 4-8, 10, 13, 15, and 18.

4. STATUS OF AMENDMENTS - 37 CFR 41.37(c) (1) (iv)

There is no unentered amendment subsequent to final rejection.

5. SUMMARY OF CLAIMED SUBJECT MATTER- 37 CFR 41.37(c) (1) (v)

Claim 1

Claim 1 is directed to a method for evaluation of a rotating object, such as a machine. See lines 6-7, in paragraph 24 of the US patent application publication (US 2004/0153268). The method provides a first operating parameter that is an actual rotational speed value. A frequency spectrum 22, 23 (FIG. 2) of the object to be tested is automatically recorded by measuring means. The frequency spectrum has first amplitude values which depend on first frequency values. The first frequency values of the frequency spectrum are automatically used for normalization in relation to the actual rotational speed value. An alarm curve 2 is automatically formed with second amplitude values

which depend on second frequency values. See lines 1-2, in paragraph 25 of the US patent application publication. The second frequency values of the alarm curve are automatically used for normalization in relation to the actual rotational speed value. See lines 7-10, in paragraph 25 of the US patent application publication. The second amplitude values of the alarm curve are automatically changed according to a second operating parameter. See lines 4-7, in paragraph 26 of the patent application publication. The operating states of the object to be tested are characterized by the second operating parameter which is proportional to a load of the object to be tested. See lines 17-20, in paragraph 28 of the US patent application publication. The operating states of the object to be tested are further characterized by a third operating parameter which is proportional to a temperature of the object to be tested. See lines 20-21, in paragraph 28 of the US patent application publication. The first amplitude values of the normalized frequency spectrum are automatically compared with the second amplitude values of the alarm curve, which is changed according to the second operating parameter, and the third operating parameter. A result of the comparison is used to evaluate the object to be tested. See entire paragraph 29 of the US patent application publication.

Claim 18

Claim 18 is directed to a method for evaluating a rotating machine. See lines 6-7, in paragraph 24 of the US patent application publication (US 2004/0153268). The method allows establishing an alarm curve, such as alarm curves 3, 4, 5 (FIG. 4 to FIG. 6) of vibration amplitude data versus frequency for a first rotating speed of a rotating machine operating at a first load value. Actual vibration amplitude data versus frequency are gathered from the rotating machine at a second rotating speed different than the first rotating speed and at a second load value different than the first load value. The actual vibration amplitude data versus frequency are normalized with respect to the first rotating

speed. The alarm curve is adjusted to account for the difference between the first and second load values. See entire paragraph 27 of the US patent application publication. The alarm curve is established for a first temperature. The actual vibration amplitude data versus frequency are gathered at a second temperature different from the first temperature. See entire paragraph 28 of the US patent application publication. The alarm curve is further adjusted to account for the difference between the first and second temperatures. The normalized data and the adjusted alarm curve are compared to evaluate the rotating machine. See entire paragraph 29 of the US patent application publication.

6. GROUNDS OF REJECTION TO BE REVIEWED UPON APPEAL - 37 CFR 41.37(c) (1) (vi)

A) Whether claims 1, 4-8, 10, 13, 15, and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over International Application Publication No. WO 99/60351 (hereinafter Lofall) in view of US Pat. No. 5,922,963 (hereinafter Piety), and further in view of EP Publication No. 0 908 805 (hereinafter Hoth).

7. ARGUMENT-37 CFR 41.37(c) (1) (vii)

A. *Regarding the rejection of claims 1, 4-8, 10, 13, 15, and 18 under 35 U.S.C. 103(a) as being unpatentable over Lofall in view of Piety and further in view of Hoth.*

Appellant argues that the Lofall/Piety/Hoth combination does not constitute an appropriate *prima facie* combination for renderings claims 1, 4-8, 10, 13, 15, and 18 unpatentable because such combination, even if combined as suggested by the Examiner, fails to teach or suggest each of the claimed elements and/or operational relationships. With regard to the rejections applied

against claims 1, 4-8, 10, 13, 15, and 18, it is appellant's belief that not all of the rejected claims stand or fall together. More specifically, independent claim 1 and dependent claims 4-8, 10, 13, 15 stand together. However, claim 18, a distinct independent claim, should be grouped separately from claims 1, 4-8, 10, 13, 15, for purposes of this appeal.

A.1 *Arguments Regarding Claim 1*

Appellant respectfully submits that the Lofall/Piety/Hoth combination fails to describe or suggest the method set forth in claim 1.

Claim 1 in part recites that the operating states of the object to be tested are characterized by a second operating parameter which is proportional to a load of the object to be tested, and are also characterized by a third operating parameter which is proportional to a temperature of the object to be tested. The amplitude values of the alarm curve are changed according to the second operating parameter, and the third operating parameter.

The Office Action correctly acknowledges that the combination of Lofall and Piety fails to describe that the alarm curve is also adjusted based on temperature. The Office Action then cites Hoth as purportedly overcoming the deficiencies of the Lofall/Piety combination. However, Hoth actually teaches away from the structural and/operational relationships recited in claim 1 regarding the utilization of temperature. More particularly, Hoth uses temperature data as a multiplier for adjusting a calculated probability of failure numbers, whereas claim 1 recites temperature as a basis for adjusting an alarm curve. Accordingly, the Lofall/Piety/Hoth combination does not constitute an appropriate *prima facie* combination for rejecting claim 1 under 35 USC 103(a), and this rejection (as well as the rejection of claims depending from claim 1) should be withdrawn.

Appellant will now discuss an alternative basis as to why the Lofall/Piety/Hoth combination does not constitute an appropriate *prima facie* combination for rejecting claims under 35 USC 103(a). Appellant will discuss

below in particular detail the substantial differences in the approach of Hoth compared to the claimed invention. Appellant regrets for the following rather lengthy summary of the process of Hoth. However, it is believed necessary to point out the substantial differences between Hoth and the present invention as to how each very distinctly approaches the relationship between vibration data alarm limits and secondary parameters, such as machine load and temperature.

Hoth describes a complex multi-step method that provides a quantitative prediction of the likelihood of a failure, which Hoth calls a "final failure probability sum." (column 13, line 41) Hoth arrives at that numeric value via a series of learning and then monitoring steps. First, in a learning mode, Hoth teaches the steps of:

- gathering raw vibration amplitude data (RD) over a number of frequency ranges (column 8, lines 31-38)

- using only data which satisfies certain stability requirements, generating twelve hour average vibration frequency values with a 95% statistical confidence level. (column 9, lines 7-19 and colun 10, lines 39-50) for each frequency band and each load range. In this step, Hoth recognizes that there is a relationship between vibration amplitude response and machine load. However, Hoth does not use that relationship for the purpose of adjusting an alarm value, but rather it causes Hoth to establish a plurality frequency bands and load ranges so as to be able to judge the stability of the acquired raw data within a plurality of ranges.

- building an hourly reading (HR) table from raw data each hour and checking to see if a sufficient number of the data points are within the confidence interval for each frequency band and load condition. (column 11, lines 27-42)

- only if the machine is running normally and is stable, entering a monitoring mode. (column 11, lines 42-46)

Once in the monitor mode, the machine is evaluated by comparing hourly average data to the confidence intervals (column 11, lines 49-53) through the following steps:

- hourly data is checked against limits that are based upon the confidence intervals, and if the limits are exceeded, a neural processor subroutine is entered for calculating a failure probability. (column 12, lines 9-32) Note that no limit is changed during this step, or in any step of the process. Each band of hourly data is compared to a respective confidence interval for each vibration band to generate a weighted probability of machine failure. (column 13, lines 1-13)

- applying load to current ratio and differential temperature factors to the weighted probabilities to arrive at a "final failure probability sum". (column 13, lines 33-41) In this manner, vibration data exceeding the confidence interval is caused to have varying effects on the final failure probability sum depending upon the load to current ratio and the differential temperature.

Note that the method of Hoth necessitates the processing of multiple sets of data over a number of load ranges. Furthermore, Hoth never adjusts the confidence interval (i.e. alarm curve) in response to load to current ratio or in response to temperature, but rather, Hoth uses these parameters only to adjust the impact of the calculated failure probability values.

In contrast to the method of Hoth, claim 1 of the present invention provides a much simpler method for evaluating an object to be tested. Claim 1 includes the step of "automatically changing ... the alarm curve according to second and third operating parameters." Hoth never changes an alarm curve; rather, Hoth teaches the necessity of splitting the load parameter into a plurality of ranges in order to provide for a degree of stability in the measured amplitude data. The present invention avoids the necessity of processing multiple sets of data as must be done in the method of Hoth.

Appellant respectfully notes that the CAFC decision in *In re Kumar*, 418 F.3d 1361, 76 USPQ2d 1048, 1053 (Fed. Cir. 2005) states "To render a later invention unpatentable for obviousness, the prior art must enable the later invention." The Hoth reference fails to enable the present invention since it fails to teach any method for automatically changing the amplitude values of an alarm curve. The use of temperature data, as actually described by Hoth, would not

enable the claimed invention. Appellant believes it is error for the Examiner to simply say that since Hoth uses temperature (albeit in a completely different manner as in the claimed invention), then Hoth remedies the shortcomings of Lofall and Piety. This assertion is not sufficient in view that the specific approach described by Hoth cannot be disregarded since such an approach would make the claimed invention (and the resulting prior art combination) inoperable for its intended purpose. See *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984) (finding no suggestion to modify a prior art device where the modification would render the device inoperable for its intended purpose). One of ordinary skill in the art would not have been motivated to combine the vastly different approach described by Hoth with the Lofall/Piety combination. Thus, on this alternative basis, appellant submits that the combination of Lofall/Piety/Hoth does not support the rejections under 35 USC 103.

In view of the foregoing remarks, it is respectfully submitted that neither Lofall, Piety, nor Hoth, singly or in combination, teach or suggest the structural and/or operational relationships set forth in claim 1. Accordingly, the Lofall/Piety/Hoth combination fails to render claim 1 unpatentable under the §103 statutory requirements and this rejection should be withdrawn. Since dependent claims 4-8, 10, 13, and 15 include the structural and/or operational relationships respectively recited in claim 1, it is also respectfully submitted that the Lofall/Piety/Hoth combination also fails to render unpatentable claims 4-8, 10, 13, and 15. Accordingly, the rejection of claims depending from claim 1, should also be withdrawn.

A.2 *Arguments Regarding Claim 18*

Independent claim 18 is directed to a method for evaluating a rotating machine. Claim 18 in part recites adjusting the alarm curve to account for a difference between first and second temperatures. As discussed above, Hoth not only fails to teach the foregoing operational relationship but actually teaches away from it, or, in the alternative, Hoth fails to enable the claimed invention. Accordingly, the Lofall/Piety/Hoth combination does not constitute an appropriate

prima facie combination for rejecting claim 18 under 35 USC 103(a), and this rejection should be similarly withdrawn.

8. CLAIMS APPENDIX - 37 CFR 41.37(c) (1) (viii).

A copy of the claims 1, 4-8, 10, 13, 15, and 18 involved in this appeal is attached as a claims appendix under 37 CFR 41.37(c) (1) (viii).

9. EVIDENCE APPENDIX - 37 CFR 41.37(c) (1) (ix)

None is required under 37 CFR 41.37(c) (1) (ix)

10. RELATED PROCEEDINGS APPENDIX - 37 CFR 41.37(c) (1) (x)

None is required under 37 CFR 41.37(c) (1) (x)

Respectfully submitted,

Dated: 1/8/07

By: _____

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Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
Iselin, New Jersey 08830

CLAIMS APPENDIX

37 CFR 41.37(c)(1)(viii)

1. A method for evaluation of a rotating object, the method comprising:

providing a first operating parameter that is an actual rotational speed value;

automatically recording a frequency spectrum of the object to be tested by measuring means, wherein the frequency spectrum has first amplitude values which depend on first frequency values;

automatically using the first frequency values of the frequency spectrum for normalization in relation to the actual rotational speed value;

automatically forming an alarm curve with second amplitude values which depend on second frequency values;

automatically using the second frequency values of the alarm curve for normalization in relation to the actual rotational speed value;

automatically changing the second amplitude values of the alarm curve according to a second operating parameter, wherein the operating states of the object to be tested are characterized by the second operating parameter which is proportional to a load of the object to be tested, and wherein the operating states of the object to be tested are further characterized by a third operating parameter which is proportional to a temperature of the object to be tested;

automatically comparing the first amplitude values of the normalized frequency spectrum with the second amplitude values of the alarm curve which is changed according to the second operating parameter, and the third operating parameter; and

using a result of the comparison to evaluate the object to be tested.

4. A method according to claim 1, wherein the second amplitude values of the alarm curve are changed according to a function of the operating parameters.

5. A method according to claim 1, wherein the alarm curve which is normalized and changed according to the operating parameters forms an envelope curve over the normalized frequency spectrum of the object to be tested in a fault-free normal condition, wherein an alarm is generated if at least one amplitude value of the normalized frequency spectrum lies outside the envelope curve.

6. A method according to claim 1, wherein the measuring means are fashioned as vibro-acoustic measuring means.

7. A method according to claim 1 for the use of a spectral evaluation of a machine.

8. A method according to claim 1 for the use of monitoring the vibration of vehicle components.

10. A method according to claim 4, wherein the function of the operating parameters is specified by a user.

13. A method according to claim 1, wherein the alarm curve which is normalized and changed according to the operating parameters forms an envelope curve over the normalized frequency spectrum of the object to be tested in a fault-free normal condition, wherein an alarm is generated if at least one amplitude value of the normalized frequency spectrum lies outside the envelope curve.

15. A method according to claim 4, wherein the alarm curve which is normalized and changed according to the operating parameters forms an envelope curve over the normalized frequency spectrum of the object to be tested in a fault-free normal condition, wherein an alarm is generated if at least one amplitude value of the normalized frequency spectrum lies outside the envelope curve.

18. A method for evaluating a rotating machine, the method comprising:

establishing an alarm curve of vibration amplitude data versus frequency for a first rotating speed of a rotating machine operating at a first load value;

gathering actual vibration amplitude data versus frequency from the rotating machine at a second rotating speed different than the first rotating speed and at a second load value different than the first load value;

normalizing the actual vibration amplitude data versus frequency to the first rotating speed;

adjusting the alarm curve to account for the difference between the first and second load values;

establishing the alarm curve for a first temperature;

gathering the actual vibration amplitude data versus frequency at a second temperature different from the first temperature;

further adjusting the alarm curve to account for the difference between the first and second temperatures; and

comparing the normalized data and the adjusted alarm curve to evaluate the rotating machine.